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NOTES ON GEOGRAPHIC DISTRIBUTION

Procellosaurinus erythrocercus Rodrigues, 1991 (Squamata: Gymnophthalmidae): Distribution extension

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ABSTRACT: We report the northernmost occurrence of *Procellosaurinus erythrocercus* in South America. This species was originally described from the paleoquaternary sand dunes complex of the São Francisco River, and found later at Serra das Confusões, Piauí state. We found *P. erythrocercus* at São Francisco de Assis do Piauí and Pavussu municipalities, Piauí state, about 253 kilometers northwest from its type locality. This record corroborates the theory that sand dune refuges were created during recent geological eras.

The family Gymnophthalmidae is a group of Neotropical small lizards distributed between the Tehuantepec Isthmus, in southern Mexico, and northern Argentina, as well as the Caribbean and some continental islands of Central and South America. They are found in open and forested habitats, and are highly associated with the undergrowth, leaf litter and humus layer (Vanzolini *et al.* 1980; Rodrigues *et al.* 2001).

Since Gymnophthalmidae was classified as distinct from Teiidae, its systematics have been marked by the discovery of numerous genera and species (Cunha *et al.* 1991; Rodrigues 1991a, b, c; 1996a, b; 1997; Vanzolini and Carvalho 1991; Hoogmoed and Ávila-Pires 1992; Carvalho 1997; Ávila-Pires and Vitt 1998; MacCulloch and Lathrop 2001; Pellegrino *et al.* 2001; Rodrigues *et al.* 2001, 2002a, b; 2009a, b), especially with the use of cytogenetic and molecular techniques (Cole *et al.* 1993; Yonenaga-Yassuda *et al.* 1995; Pellegrino *et al*. 1999a, b; 2001; Yonenaga-Yassuda and Rodrigues 1999; Bertolloto *et al.* 2002; Castoe *et al.* 2004).

Many of these species were discovered in the Brazilian semi-arid morphoclimatic domain knew as Caatinga. Within this domain, we focus on the ecoregion of the paleoquaternary dune fields of the middle São Francisco River, (Rodrigues 2003; Borges-Nojosa and Cascon 2005), the type locality of seven gymnophthalmids that were previously considered endemics (Rodrigues 1996b).

Rodrigues (1991) described two species of the genus *Procellosaurinus*. The original distribution of these two species was at two sand dune fields: *P. erythrocercus* (Figure 1) at Ibiraba (10°48' S, 42°50' W) and Alagoado, Brazilian state of Bahia (09°29' S, 41°21' W), while *P. tetradactylus* were found only at the second location. These localities are relatively isolated and harbor other endemic species of lizards and snakes (Rodrigues 1991a; 1996b). *Procellosaurinus erythrocercus* was later found at Serra das Confusões, Piaui (09°15' S, 43°32' W) (Freitas and Silva, 2007).

During a field expedition to Piauí state, we collected (SisBio/ICMBio permits n. 15363-1) *P. erythrocercus* in two municipalities: Pavussu (07°57'07" S, 43°32'01" W) and São Francisco de Assis do Piauí (08°03'37" S, 41°31'16" W) (Figure 2). The lizards were found in a forested Caatinga, with sandy soils, but no sand dunes. These records extend the distribution 253 km from the type locality and 110 km from Serra das Confusões. The specimens were deposited in the Coleção Herpetológica da Universidade Federal da Paraíba, Paraíba state, Brazil (CHUFPB 00279; CHUFPB 00932; CHUFP 00933; CHUFPB 00934; CHUFP 00968).

Other distribution extensions of gymnophthalmids from the dunes complex of the São Francisco were previous published. *Calyptommatus confusionibus* was described from Parque Nacional Serra das Confusões, Piauí state, extending the genus distribution 120 kilometers north from the Bahia sand dunes (Rodrigues *et al.* 2001). Delfim *et al*. (2006) reported *Psilophthalmus paeminosus* (originally considered an endemic of the dunes), at the municipality of Canidé do São Francisco, state of Sergipe, about 540 kilometers east of the type locality.

This new report of *P. erythrocercus* supports the

FIGURE 1. *Procellosaurinus erythrocercus* collected at the dune fields of São Francisco river, state of Bahia, Brazil.

hypothesis suggested by Rodrigues *et al.* (2001), which posits that these gymnophthalmid distributions are based on the recent geological history (Pleistocene-Holocene) of the São Francisco sand dunes. Southeast winds may have affected the distribution and size of dune fields (Ab'Saber 1977; Rodrigues 1987; Oliveira *et al.* 1999), and consequently the distribution of *P. erythrocercus*. The most recent retraction of the dunes restricted them to their present distribution and size, creating some sandy "islands" which acted as refuges to species associated with them. This interpretation is similar to the Pleistocene forest refuges suggested by Vanzolini and Williams (1981).

Additionally, the increasing knowledge of the Caatinga domain has led to the distribution extension of some species previously described as endemic to the São Francisco River dunes. These species are restricted to sandy areas, so all of those areas could have been an extensive sand dune field in the past.

Finally, the presence of *P. erythrocercus* in two localities of Piauí state presents a significant distribution extension from previous known localities, and the possible presence of another species, *P. tetradactylus*, should be investigated in Piauí.

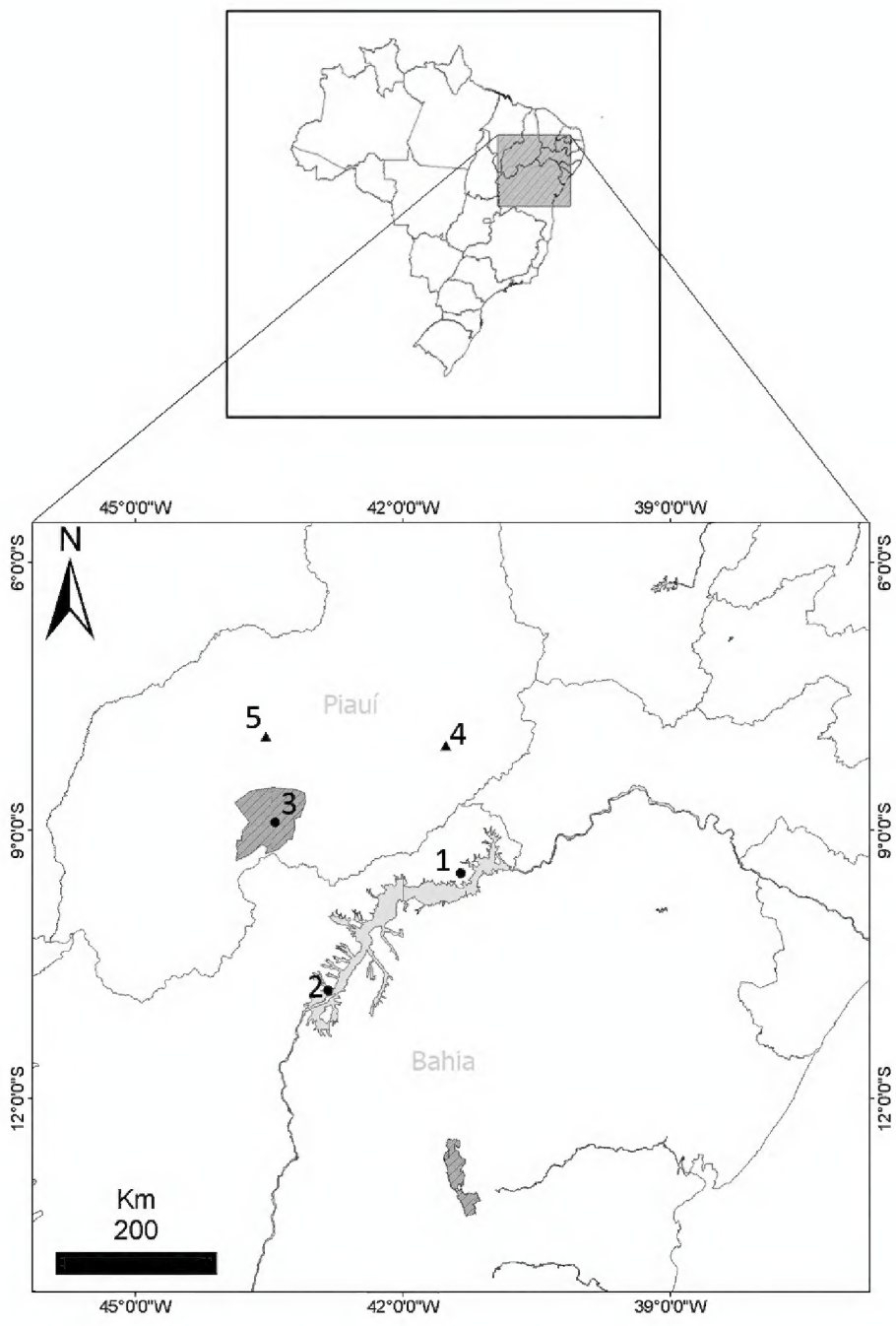

Figure 2. Known geographic distribution of *Procellosaurinus erythrocercus*, including the new localities reported here. Circles = previous localities: 1) Alagoado; 2) Ibiraba; 3) Serra das Confusões; triangles = new records: 4) São Francisco de Assis do Piauí; 5) Pavussu.

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